

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A method of producing Simonkolleite comprising the steps of:

providing a high concentration chloride solution including zinc chloride complex; and
adding water to the high concentration chloride solution to reduce the chloride concentration in the high concentration chloride solution so as to produce a reduced concentration chloride solution having a specific gravity less than 1.45, wherein adding said water results in at least 30% of said zinc chloride complex precipitating out of the reduced concentration chloride solution as Simonkolleite and zinc ~~oxide/hydroxide~~ oxide and/or hydroxide.

2. (Canceled)

3. (Currently amended) A zinc oxide manufacturing process comprising the steps of:

providing a metals bearing feed stock;
providing a chloride leach solution with a specific gravity in a range of 1.45 to 1.55;
reacting the metals bearing feed stock and the chloride leach solution to form a complex solution including a metal chloride complex and calcium hydroxide;
adding water to the complex solution to reduce a chloride concentration in the complex solution so as to produce a cementation solution having a specific gravity within a range of 1.40 to 1.49;

adding zinc to said cementation solution, wherein said zinc added to said cementation solution is below the metal in the metal chloride complex on the electrochemical replacement series such that the zinc added to the cementation solution will substitute with the metal in the metal chloride complex to form a zinc chloride complex and such that the metal substituted out of the metal chloride complex will cement out of the cementation solution;

adding water to the zinc chloride complex to produce a zinc chloride complex solution having a reduced chloride concentration with a specific gravity within a range of 1.37 to 1.45, wherein adding said water results in at least 30% of said zinc chloride complex precipitating out of the zinc chloride complex solution as Simonkolleite;

adding a base to the zinc chloride complex solution wherein adding said base results in at least an additional 60% of said original zinc chloride complex precipitating out of the zinc chloride complex solution as ~~Simonkolleite/zinc~~ Simonkolleite oxychloride;

adding water to the Simonkolleite to produce a Simonkolleite ~~solution~~ slurry; and

adding a base to the Simonkolleite ~~solution~~ slurry to produce zinc oxide having a purity of at least 98% and containing less than 1,000 ppm chlorides.

4. (New) The method of producing Simonkolleite of Claim 3 further comprising the step of:

adding a base to the reduced concentration chloride solution wherein adding said base results in at least an additional 60% of said zinc chloride complex originally in said high concentration chloride solution, precipitating out of the reduced concentration chloride solution as Simonkolleite.

5. (New) The method of producing Simonkolleite of Claim 4 wherein the process takes place at atmospheric pressure.

6. (New) The method of producing Simonkolleite of Claim 4 wherein the process takes place at a temperature less than 130 degrees Celsius.

7. (New) The method of producing Simonkolleite of Claim 4 wherein the process takes place at a temperature of less than 30 degrees Celsius and precipitates approximately 95% of the zinc chloride complex out of solution.

8. (New) The method of producing Simonkolleite of Claim 4 wherein the reduced concentration chloride solution has a pH in a range of 3.5 to 9.0.

9. (New) The method of producing Simonkolleite of Claim 4 wherein the reduced concentration chloride solution has a pH in a range of 5.0 to 7.5.

10. (New) The method of producing Simonkolleite of Claim 5 wherein at least 90% of said zinc chloride complex precipitates out of the reduced concentration chloride solution as Simonkolleite.

11. (New) The method of producing Simonkolleite of Claim 5 wherein said base comprises at least one compound selected from the group consisting of calcium hydroxide, calcium oxide, sodium hydroxide, and potassium hydroxide.

12. (New) The method of producing Simonkolleite of Claim 4 wherein the reduced concentration chloride solution contains zinc at a concentration greater than 500 ppm.

13. (New) The method of producing Simonkolleite of Claim 4 wherein the reduced concentration chloride solution contains zinc at a concentration greater than 10,000 ppm.

14. (New) The method of producing Simonkolleite of Claim 5 wherein the steps of adding the water and adding the base are conducted simultaneously.

15. (New) The method of producing Simonkolleite of Claim 4 wherein the process takes place at a temperature between the crystallization temperature of the reduced concentration chloride solution and the boiling temperature of the reduced concentration chloride solution.

16. (New) The method of producing Simonkolleite of Claim 4 wherein the reaction is exothermic and the process further comprises the step of cooling the reduced concentration chloride solution.

17. (New) The method of producing Simonkolleite of Claim 4 wherein said Simonkolleite comprises a portion of a filter cake and further comprising the step of washing the filter cake with a hot solution of calcium chloride in water to remove excess potassium chloride from the filter cake.

18. (New) The method of producing Simonkolleite of Claim 17 wherein the hot solution of calcium chloride in water is at a temperature between 70 and 130 degrees Celsius and has a specific gravity between 1.41 and 1.45.

19. (New) The method of producing Simonkolleite of Claim 4 wherein said Simonkolleite comprises a portion of a filter cake and further comprising the step of washing the filter cake with hot water to remove excess soluble chlorides.

20. (New) The method of producing Simonkolleite of Claim 19 wherein the hot water is at a temperature between 20 and 100 degrees Celsius.

21. (New) The zinc oxide manufacturing process of Claim 3 wherein the step of reacting the metals bearing feed stock and the chloride leach solution takes place at atmospheric pressure, the chloride leach solution includes calcium chloride and a chloride ion concentration great than 10 molar, the temperature is above 65 degrees Celsius, and the pH of the complex solution is maintained above 3.5 and below 9.0.

22. (New) The zinc oxide manufacturing process of Claim 3 wherein, in the step of reacting the metals bearing feed stock and the chloride leach solution, the metal in the metal chloride complex comprises one or more metals selected from the group consisting of zinc, lead, cadmium, silver, copper, tin, nickel, and other metals in the electrochemical series above zinc.

23. (New) The zinc oxide manufacturing process of Claim 3 wherein the process utilizes water to maintain the specific gravity of the chloride leach solution in a range of 1.45 to 1.55.

24. (New) The zinc oxide manufacturing process of Claim 3 wherein the cementation solution has a pH in a range of 5.0 to 8.0, and the step is conducted at atmospheric pressure and at a temperature greater than 65 degrees Celsius.

25. (New) The zinc oxide manufacturing process of Claim 3 wherein the steps of adding water and a base to the zinc chloride complex solution takes place at atmospheric

pressure and at a temperature of approximately 25 degrees Celsius, wherein the reduced concentration chloride solution has a pH in the range of 3.5 to 9.0, and wherein said base comprises at least one compound chosen from the group consisting of: calcium hydroxide, calcium oxide, sodium hydroxide, and potassium hydroxide.

26. (New) The zinc oxide manufacturing process of Claim 3 wherein said Simonkolleite comprises a portion of a filter cake and further comprising the step of washing the filter cake with a hot solution of calcium chloride in water to remove excess potassium chloride from the filter cake.

27. (New) The zinc oxide manufacturing process of Claim 26 wherein the hot solution of calcium chloride in water is at a temperature between 65 and 130 degrees Celsius and has a specific gravity between 1.41 and 1.45.

28. (New) The zinc oxide manufacturing process of Claim 3 wherein the step of adding a base to the water and zinc chloride complex solution takes place at a temperature in a range of 140 to 200 degrees Celsius, in a pH range of 6.9 to 7.4, and at atmospheric pressure.